Fire Alarm Standard Operating Procedure

Responsibility: Electrician, FMC

These procedures address the preventive maintenance program installed for the station fire alarm system and directions for working on the system.

Station Fire Alarm System

The station fire alarm system is controlled by a Pyrotronics System 3 fire detection system. This system is not an addressable system. In other words, it is set up in a zone configuration and will not be able to give a specific device that is in the "trouble" mode. According to the manuals provided by the manufacturer, each detector and initiating device should be cleaned and tested for operational reliability and optimum performance every six months. The preventive maintenance shall be performed at the beginning of each season.

There are four different components that make up the system. Detection, initiating, ansul, and monitoring panel. The following procedures are the preventive maintenance steps for each component.

Note The operation manuals and system information are located in the file cabinets in the back of the FMC office. Before working on the system, these should be studied to increase knowledge of the system.

Note **ALL WORK MUST BE COMPLETED BY THE END OF EACH WORKING DAY! FA SYSTEM CANNOT STAY OFF OVERNIGHT!!!**

1. Detection

The detection system is comprised of ionization smoke detectors and thermal detectors. There are no duct smoke detectors on station.

Ionization Smoke Detector Cleaning and Testing

1. First notify station manager that you will be working on the fire detection system and that normal operation will be interrupted. Give a time schedule for begin to end of work.
2. Notify station personnel via the all-call system that the alarm system will be interrupted in the area of testing until a predetermined time.
3. You will need a second person to stand at the panel and silence the panel alarm when you are working on the system. They will not have to be there the entire time you are working on the system, only when you are testing. This is to ensure that not only the panel alarm is silenced but also to verify the zone you are working on.
4. Go to the FA panel and remove the fuses in the audible alarm modules. These will be marked as horns for each of the buildings. There will be four fuses, place them in the plastic bag located in the door. When you remove the first fuse the panel alarm will sound. Press the "trouble silence" switch to silence panel alarm.
5. Once you have removed the fuses, locate the zone module for the area that you will be working on.
6. Each zone module has two tags with descriptions of what it serves. There is a map of the zones for each zone located in the FA file. Locate which device you are working on and the zone that it belongs to using this map. **NEVER ASSUME THE TAGS ON THE MODULES ARE CORRECT. USE THE MAP!**
7. Disconnect the wires for that zone. There are two zones per module. They are connected to the numbers 2 and 3, 4 and 5. The directions for the polarity of these terminals are located on the panel door. Terminals 2 and 3 are for the top tag, and terminals 4 and 5 are for the bottom tag.
8. Press the alarm silence switch to silence the horns in the carp shop. The horns in the carp shop are wired on the detection system and will not be silenced unless the "alarm silence" button is pushed or the circuit "trouble is cleared.

9. There are two lights on the module. The red light illuminates when there is an alarm on the system. The yellow light illuminates when there is a "trouble" condition on the system. When you disconnect the wires for a specific zone the "trouble" or yellow light will illuminate on the module. This means the module is in the "trouble" condition.
10. Take one of the end-of-line (EOL) capacitors and connect it to the terminals according to polarity. There will be a "+" symbol marked closest to one end. That is the "positive" end.
11. When the EOL capacitor is connected properly the "trouble" light should go off. If it doesn't go off, check the polarity and correct the position of the capacitor wires.
12. By placing the EOL capacitor on the terminals you are completing the circuit and the system is no longer in the "trouble" state. Therefor, if there is an actual alarm, only the alarm on the panel will sound until it is silenced. You are now free to work on that specific zone that the EOL capacitor is connected to.
13. To remove the detector from the base, firmly grip the base and rotate the detector head while slightly pushing up. The detector will come loose when in position.
14. Take the detectors to the shop. Disconnect the shroud that covers the detector head. Use the compressed air to remove any dust or particles from the detector and it's shroud. Beware not to use full air due to the sensitivity of the device.
15. Make sure that the detectors that have been cleaned are covered or protected from dust when cleaning the other detectors.
16. After you have cleaned the detectors replace each one by reversing the removal procedure.
17. Once you have re-installed all the detectors in the area return to the fire alarm panel.
18. Remove the EOL capacitor and re-connect the wires for the zone that you were working on. **Make sure the polarity is correct!**
19. Once the wires are placed under the terminals the "trouble" light will go off. Again, if the light does not turn off when the wires are re-connected to the terminals, check the polarity of the wires at the terminal connection. Correct position of connections.
20. If this does not alleviate the problem, one of the detectors might be in alarm. Go back to the are you were working on and start from beginning to end of the line. Check each detector to make sure the detector is securely fastened in the base. When the ionization smoke detector is in alarm the LED will be illuminated. The detector might have a dust particle or the sensor might have been damaged during cleaning.

21. Remove the detector and try blowing air through the detector to free any dust trapped on the sensor. Re-install the detector. If the LED is still illuminated then the sensor might have been damaged. Replace with a new detector.
22. Return to the FA panel, the light should be off.
23. If you have enough time left in the day to begin and finish another zone then repeat the beginning steps. You won't have to notify the station manager or the FMC Supervisor until the end of the day when you are finished working on the system.
24. When you are finished with the cleaning or any work being performed on the system, return to the FA panel.
25. Check to make sure that no zones are indicating an "alarm" or trouble condition.
26. Remove the EOL capacitor of the zone you are working on and re-connect the wires on the proper terminals.
27. Put the fuses for the siren and horns back in and press the silver "Reset" toggle switch. The system is now back on line.
28. Notify the Station Manager and the FMC Supervisor that the system is on line and the work is complete so that an announcement can be made to alert the fire response.

Thermal Heat Detectors Cleaning and Testing

The thermal heat detectors come in two different ratings for temperature. 135 degrees and 200 degrees. Both are rate of rise, which means they will alarm if the rate of the heat rises at more than 15 degrees per minute. They are both listed in the fire alarm file and have a chart to determine which markings are what on the detector. These two detectors are the restorable types, which means when you activate them by using a heat gun and then remove the heat they will restore to normal operation.

1. To begin work follow steps 1 – 12 for the ionization detectors.
2. The locations for the thermal detectors are anywhere there will be a heat condition already present. Locate the zone that you will be working on by using the maps of the station that are located in the FA file.
3. Cleaning is simple. Take a damp rag and wipe the detector clean of any dust or particle accumulation.

4. Using the heat gun, direct heat at the detector until the detector goes into alarm. Make sure not to put the heat gun too close to the detector. These detectors are the resetting types.
5. After the detector has been activated, return to the panel to determine the correct location and confirm alarm.
6. The detector will reset itself after it begins to cool down. Proceed to the next detector.
7. When you are finished with the testing and cleaning return to the panel and follow the procedures for bringing the system back online.
8. If the system does not reset, check the polarity of the terminals on the detector or the zone module terminals. The module will automatically go into alarm when you connect the wires to the terminals if the polarity is incorrect.

ANSUL System and Testing

The ANSUL system is an extinguishing system operated independently of the normal fire extinguishing system. They are located where there are hazardous materials stored that require halon extinguishing agent to be discharged. The ANSUL system is composed of an initiating device (ie; pull station, heat detector), halon bottles with a release system, and a control panel or zone module that controls the alarm and release of the halon. There are control panels located in the following locations and there purpose:

GWR Garage – Power Plant ANSUL
BIO Mech Room – Emergency Generator Room
GWR USAP Supply – HAZ COM Bldg.
ANSUL Module in FACP - Volatile Storage
ANSUL Cable system in milvan's with a signaling circuit to the FACP – Hazardous Storage Milvan's / Lab 1

NOTE: The actual testing of the extinguishing agent and bottles are done by the RPSC Safety and Health Supervisor. THEY ARE NOT TO BE TESTED BY UNAUTHORIZED STATION PERSONNEL!!!

Actuation of any detector shall:

- Illuminate the respective circuit lamp on the control panel.

- Energize a horn/strobe inside the are and a strobe light outside the area in which the detector was operated.
- Normally open relay contacts will signal the emergency stop control for each engine.
- Normally open relay contacts will energize a solenoid valve to shut off the flow of diesel fuel to the room.
- Normally open contacts will transmit a signal to the existing fire alarm system.
- After a 60-second time delay, the extinguishing agent will be discharged. Vacate the area, keep the doors closed and do not re-enter the area.

Steps:

1. First notify station manager that you will be working on the fire detection system and that normal operation will be interrupted. Give a time schedule for begin to end of work.
2. Notify station personnel via the all-call system that the alarm system will be interrupted in the area of testing until a predetermined time.
3. You will need a second person to stand at the panel and silence the panel alarm when you are working on the system. They will not have to be there the entire time you are working on the system, only when you are testing. This is to ensure that not only the panel alarm is silenced but also to verify the zone you are working on.
4. Go to the FA panel and remove the fuses in the audible alarm modules. These will be marked as horns for each of the buildings. There will be four fuses, place them in the plastic bag located in the door. When you remove the first fuse the panel alarm will sound. Press the "trouble silence" switch to silence panel alarm.
5. The zone module that controls the ANSUL systems is marked with a red label. The red module at the bottom left corner is for the volatile storage.
6. Start with one ANSUL system at a time.

NOTE: There are 3 different types of ANSUL controllers. The module in the FA Control Panel, Auto Pulse 1000 (located on North East wall in USAP supply for Hazardous Building), Auto Pulse 2000 (one located in the garage outside the power plant and the other located outside the emergency generator room. Both servicing each respectively)

FACP MODULE FOR VOLATILE STORAGE AND MILVAN'S – HAZARDOUS STORAGE

1. The ANSUL control module for the volatile storage is located in the lower left hand corner of the control panel.
2. Press the silver toggle switch marked "normal" and "disc" to "DISC". This will disable the alarm for the "Volatile Storage". The milvan's are operated by a cable release system that when activated will alarm the FACP. The volatile storage is operated by an electric switch, which is operated by either the pull station or smoke detectors inside the building. Any activation device on the system **MUST** be disconnected to prevent an accidental release of the extinguishing agent.
3. Remove the wires from the "2" and "3" terminals on the zone modules marked "volatile storage".
4. Proceed to the hoist room and carefully disconnect the hose from the extinguishing agent bottle to ensure that there won't be an accidental release.
5. Make sure that the electrical connection to the release mechanism is disconnected.
6. Go back to the FACP and reconnect the "2" and "3" terminal wires for the "volatile storage" to do a system test.
7. Proceed to the volatile storage building.
8. Using the smoke tester that is provided in the FMC office test each detector in the building. Make sure the correct zone module lights are illuminated.
9. When you are done with the volatile building make sure you reconnect the hose to the bottle and the connections to the electrical release are reconnected.
10. The milvan – hazardous storage is a cable operated system.
11. Go to the FACP and connect the "2" and "3" terminal wires for the "milvan's – hazardous storage" zone module.

12. Find the fire alarm connection and just activate the switch without actually activating the cable system. **Make sure the release will not activate.**
13. Make sure the correct zone module lights are illuminated.
14. After you are done with testing both the volatile storage and the milvan – hazardous storage return to the FACP and make sure the "2" and "3" wires are reconnected back to the terminals for the proper zone moduleand the polarities are correct.
15. Press the toggle switch at the top of the panel to "RESET".
16. Make sure system resets. If it doesn't, follow the procedure in the "ionization smoke detectors" section numbers18 – 20 for troubleshooting.
17. After the system resets push the toggle switch on the red module at the bottom left corner back to "NORM" .
18. Replace the fuses in the horn modules.
19. Notify appropriate people the system is back on line.

ANSUL PULSE 1000, AND PULSE 2000 CONTROLLERS

These controllers are not connected to the FACP as the volatile storage and the milvan – hazardous storage are. The actual ANSUL release control is located at the activation point rather than at the FACP. The only thing connected to the FACP is a signaling circuit from the controller to the FACP to tell the FACP that there is an alarm in that area. The following are instructions to make sure that the signaling circuit is functioning correctly and the proper zone modules are activated in the FACP. Both types of controllers have the same maintenance procedures. The system manuals are located in the FMC Supervisor's office on the shelf to the right when you first walk into the office.

NOTE: The actual testing of the extinguishing agent and bottles are done by the RPSC Safety and Health Supervisor. THEY ARE NOT TO BE TESTED BY UNAUTHORIZED STATION PERSONNEL!!!

CAUTION!!
FIRE SUPPRESSION SYSTEMS CONTAIN AGENT UNDER PRESSURE. DISCHARGE WILL OCCUR IF AN ELECTRIC ACTUATOR IS STILL INSTALLED ON THE STORAGE TANK MODULE OR AN EXPELLANT GAS CARTRIDGE REMAINS IN A RELEASE MECHANISM DURING AN OPERATIONAL, MAINTENANCE, OR SYSTEM TEST PROCEDURE.

MAKE CERTAIN ALL RELEASING DEVICES/GAS CARTRIDGES INSTALLED ARE REMOVED FROM ANY STORAGE TANK MODULE OR RELEASING DEVICE BEFORE CONDUCTING ANY OPERATIONAL, MAINTENANCE, OR SYSTEM TEST PROCEDURE!!!

SEMI – ANNUAL MAINTENANCE:

1) Follow steps 1 – 6 in the beginning of the ANSUL System section.
2) Pick a controller to start with.
3) Remove each electric actuator from each agent storage tank assembly or cartridge from each releasing device. If possible, leave components electrically installed to the control system for the system check – out.
4) Activate at least one initiating device (detector or manual pull station) to ensure that the proper functions take place.
5) All alarm signaling device(s), release device(s), etc., should operate and any external equipment operation (i.e., fan shut down, fuel shut down) should take place.
6) Inspect all initiating devices (detectors and manual pull stations), for dirt and dust accumulations, damage, or anything else which may affect their operation.
7) Replace any battery that has been in-service for more than three (3) years.
8) Check condition of each on-line emergency battery by completing the following steps: